

## Grigoriĭ Filippovich Drukarev (Obituary)

Yu. N. Demkov

Usp. Fiz. Nauk **154**, 339–340 (February 1988)

Grigoriĭ Filippovich Drukarev, professor of physics at Leningrad State University well known both in the Soviet Union and abroad for his research in theoretical atomic physics passed away on October 7, 1986. For the many who knew Grigoriĭ Filippovich over the decades this is an irremediable loss.

G. F. Drukarev was born on April 15, 1919 in Mogilev (Belorussian SSR) into the family of a hatmaker. In the years 1936–1941 he studied at the physics department of Moscow University, where he attended I. E. Tamm's famous lectures on quantum mechanics.<sup>1)</sup>

During the war G. F. Drukarev joined the reserve troops but was subsequently demobilized because of severe myopia. In 1945 he began graduate study under Ya. I. Frenkel' at the Leningrad Physicotechnical Institute: he graduated and defended his Candidate of Science dissertation ahead of schedule.

After overcoming some difficulties with employment and accommodations (he and his family had to live in a hotel for about a year) he began working at the theoretical physics department of Leningrad State University where, over the course of almost forty years, he worked his way from laboratory technician to lecturer, assistant professor, and, finally, professor. He lectured mainly on quantum mechanics and scattering theory, advising many undergraduate and graduate students, a number of whom defended doctoral dissertations. He published two monographs<sup>1,2</sup> and wrote a textbook on quantum mechanics based on his course intended for theoretical physics students at Leningrad State University. He completed the textbook only shortly before his death.

G. F. Drukarev's research was mainly in the field of electron and atom collisions. Let us note only some of his works. As early as 1949 he was the first to derive an equation for the phase of a wavefunction.<sup>3</sup> That series of papers subsequently grew into an entire research branch which he discussed in the well-known 1968 monograph.<sup>4</sup>

A number of Drukarev's papers on the derivation and solution of the self-consistent field equations for electron-atom collisions was published during the years when V. Ya. Vel'dre was his student—subsequently Vel'dre led the world famous research school on the theory of electron-atom collisions in Riga. Grigoriĭ Filippovich always maintained close ties with the Riga school and can rightly be considered one of its founders.

A number of papers coauthored by Grigoriĭ Filippovich and myself addressed the behavior of weakly coupled systems in external fields using the so-called zero-range potential approach. That research is reviewed in Ref. 6 as well as in Grigoriĭ Filippovich's review article.<sup>7</sup> It was a pleasure to work with him; I feel that in many respects we complemented each other and I will never forget the fruitful discussions that took place during the writing of those papers.

In the field of general theoretical physics Grigoriĭ Filippovich authored an important paper on the cross-wise behavior of the zeroes of the Jost function during the transition



GRIGORIĖ FILIPPOVICH  
DRUKAREV  
(1919–1986)

of stationary states into quasistationary ones<sup>8</sup> in which he proved an elegant theorem on the alternating sequence of bound and free states.

Grigoriĭ Filippovich's last paper on the *l*-ordering of excited Rydberg states proved extremely timely and is now widely discussed, testifying to his undying interest in the newest and most pressing problems of atomic physics.

Grigoriĭ Filippovich played a major role in the organization of an atomic collision theory seminar in the department; by now this seminar has grown to welcome participants from other departments (mathematics and mechanics), institutes (State Optical Institute, Physicotechnical Institute, and others), and cities (Moscow, Riga, Tashkent, Tbilisi, Uzhgorod, etc.). This seminar became a school for young scientists: the readiness and alacrity with which Grigoriĭ Filippovich responded to any new problem always served as an example for others, as well as making the seminar interesting, informal, and attractive.

He exhibited this responsiveness and eagerness to participate in any reasonable project in the department, the university and in all of his endeavors.

Grigoriĭ Filippovich traveled widely to represent our national science abroad. He had visited the Mongolian People's Republic, Albania, East Germany, Hungary, Czecho-

slovakia, Yugoslavia (twice), U.S.A. (twice), Holland (twice), and Sweden. He often delivered research and review talks at All-Union and International conferences, demonstrating the high level of scientific achievement in the Soviet Union and at Leningrad State University.

We all remember Grigorii Filippovich as a lively man, quick with a joke or extemporaneous verse, the life of every get-together, meeting, anniversary, always ready to help and support a friend in a difficult moment.

At the same time he knew how to be firm and resolute in dealing with unprincipled people who, for example, tried to affix idealistic labels to new physical theories with self-serving intent. He often spoke at the philosophy seminar in support of the correct dialectical materialist approach to relativity and quantum mechanics, developing and disseminating V. A. Fock's ideas on this subject. Although he was not a student of Fock's in the beginning, after thirty years of cooperation he certainly became one and gradually took on Vladimir Aleksandrovich's style and technique: mathematically rigorous and nontrivial formulations of physical problems; elegant, deeply physical and heuristically rich solutions; interest in the profound questions of physical interpretation.

I remember once, when I was still a student or perhaps just began working—in 1948–1950—at our traditional seminar Vladimir Aleksandrovich began applauding in approval of Grigorii Filippovich's derivation of some nonobvious result for the zeroes of the Bessel function. One had to know Vladimir Aleksandrovich to fully appreciate this: I know of no other such incident in the history of the seminar.

When a friend passes on the rest of us become responsi-

ble for maintaining and furthering all the good that he contributed to science, to our department and university. Let us do our best.

<sup>1</sup>He studied alongside such well-known physicists as Academicians G. I. Budker and G. T. Zatspein, Corresponding Members of the USSR Academy of Sciences I. S. Shapiro, F. L. Shapiro, and others

<sup>1</sup>G. F. Drukarev, *The Theory of Electron-Atom Collisions*, Academic Press, N. Y., 1965 [Russ. original, Fizmatgiz, M., 1963].

<sup>2</sup>G. F. Drukarev, *The Collisions of Electrons with Atoms and Molecules*, Plenum Press, N. Y. (in press) [Russ. original, Nauka, M., 1978].

<sup>3</sup>G. F. Drukarev, "Determination of the wavefunction phase in particle collisions," *Zh. Eksp. Teor. Fiz.* **19**, 247 (1949).

<sup>4</sup>V. V. Babikov, *The Method of Phase Functions in Quantum Mechanics* (in Russian), Nauka, M., 1968).

<sup>5</sup>G. F. Drukarev, "The theory of collisions of electrons with atoms," *Zh. Eksp. Teor. Fiz.* **25**, 129 (1953); "The use of integral equations in computing effective cross-sections," *Zh. Eksp. Teor. Fiz.* **25**, 139 (1953); "The theory of collisions of electrons with atoms," *Zh. Eksp. Teor. Fiz.* **31**, 288 (1956) [*Sov. Phys. JETP* **4**, 309 (1957)].

<sup>6</sup>Yu. N. Demkov and V. N. Ostrovskii, *Zero-Range Potential Method in Atomic Physics* (in Russian), Izd. Leningrad. Univ., L., 1975.

<sup>7</sup>G. F. Drukarev, "The zero-range potential model and its applications in atomic and molecular physics," *Adv. Quantum Chem.* **11**, 251 (1978).

<sup>8</sup>Yu. N. Demkov and G. F. Drukarev, "Second order poles of the *S*-matrix and resonance scattering," *Zh. Eksp. Teor. Fiz.* **49**, 691 (1965) [*Sov. Phys. JETP* **22**, 479 (1966)].

<sup>9</sup>G. F. Drukarev, "Excitation of hydrogen-atom states with large *n* and *l* by electron impact," *Zh. Eksp. Teor. Fiz.* **83**, 946 (1982) [*Sov. Phys. JETP* **56**, 532 (1982)].

Translated by A. Zaslavsky